

Claims

- [c1] 1. A self leveling camera support apparatus for helping isolate a camera from a rolling axis motion of a support structure, comprising:
- (a) a frame having a longitudinal axis, said frame including a first end that is adapted to attach to a support structure and a second end that forms a pivotal connection having a pivotal roll axis; and
 - (b) a roll member adapted to attach to the camera, said roll member is pivotally attached to said pivotal connection by a pivotal shaft, being operational to pivot parallel to said pivotal roll axis, said roll member also includes an extension arm having a longitudinal axis, said extension arm including a proximal end portion that is adjacent to said roll member, said extension arm longitudinal axis being positioned approximately perpendicular to said pivotal roll axis, said extension arm also including a distal end portion that is adjacent to a counter balance weight, said roll member is operational to help maintain the camera positional orientation level in relation to arbitrary pivotal roll movement of said frame, resulting from a selectively positioned center of mass of said roll member, camera, extension arm, and counterbalance

weight combined, said center of mass being positioned between said pivotal roll axis and said frame first end, wherein said frame longitudinal axis and said extension arm longitudinal axis form a parallel to angular relationship.

[c2] 2. A self leveling camera support apparatus according to claim 1 further comprising a dampener that is positioned adjacent to both said frame and said roll member, said dampener is operational to help control a relative arbitrary pivotal roll movement of said frame to said roll member.

[c3] 3. A self leveling camera support apparatus according to claim 2 wherein said dampener is a piston and cylinder type utilizing a restriction orifice to control the flow of a fluid from said piston and cylinder to control a movement of said piston in relation to said cylinder, wherein said control of movement between said piston in relation to said cylinder results in said control of relative arbitrary pivotal roll movement of said frame to said roll member.

[c4] 4. A self leveling camera support apparatus according to claim 3 wherein said dampener restriction orifice is variable in size, being operational to further control the movement of said piston in relation to said cylinder.

[c5] 5. A self leveling camera support apparatus according to claim 3 wherein said dampener is driven by said roll member pivotal shaft that is rotatably attached to a pivotal shaft drive gear, said pivotal shaft drive gear is rotationally engaged to an idler gear, and said idler gear is rotationally engaged to a gear rack on said piston, wherein said relative arbitrary pivotal roll movement of said frame to said roll member is transmitted into said piston movement in relation to said cylinder by said pivotal shaft and drive gear, said idler gear, and said gear rack on said piston.

[c6] 6. A self leveling camera support apparatus according to claim 1 wherein said frame first end that is adapted to attach to the support structure includes an arcuate section configured to substantially conform to a portion of a marine vessel rail outside circumference, a rail clamp pivotal element that is pivotally attached to said frame first end, and a rail clamp fastener, wherein said frame first end is operational to attach to a marine vessel rail.

[c7] 7. A self leveling camera support apparatus according to claim 1 wherein said extension arm proximal end portion that is adjacent to said roll member further comprises a fixably adjustable element that allows said extension arm including said extension arm longitudinal axis to selectively deviate from being approximately perpendic-

ular to said pivotal roll axis, wherein said fixably adjustable element is operational to accommodate a camera with an offset center of gravity by altering the position of said center of mass.

[c8] 8. A self leveling camera support apparatus according to claim 7 wherein said fixably adjustable element includes an aperture in said roll member that rotationally receives and axially retains said extension arm proximal end portion allowing a selected rotational position of said extension arm to be locked in place with a roll member lockable element, with said extension arm proximal end portion including a fixed angle portion.

[c9] 9. A self leveling camera support apparatus according to claim 1 wherein said counter balance weight that is adjacent to said extension arm distal end portion is removably engagable from said extension arm distal end portion, being operational to selectively change the amount of counterbalance weight, being operational to alter or maintain a selected position of said center of mass, thus accommodating different weight cameras.

[c10] 10. A self leveling camera support apparatus according to claim 1 wherein said counter balance weight that is adjacent to said extension arm distal end portion is movably engagable along said extension arm distal end

portion, being operational to selectively change the distance of said counterbalance weight from said roll member, being operational to alter or maintain a selected position of said center of mass, thus accommodating different weight cameras.

- [c11] 11. A self leveling camera support apparatus for helping isolate a camera from a rolling axis motion of a support structure, comprising:
- (a) a frame having a longitudinal axis, said frame including a first end that is adapted to attach to a support structure and a second end that forms a pivotal connection having a pivotal roll axis;
 - (b) a roll member adapted to attach to the camera, said roll member is pivotally attached to said pivotal connection by a pivotal shaft, being operational to pivot parallel to said pivotal roll axis, said roll member also includes an extension arm having a longitudinal axis, said extension arm including a proximal end portion that is adjacent to said roll member, said extension arm longitudinal axis being positioned approximately perpendicular to said pivotal roll axis, said extension arm also including a distal end portion that is adjacent to a counter balance weight, said roll member is operational to help maintain the camera positional orientation level in relation to arbitrary pivotal roll movement of said frame, resulting

from a selectively positioned center of mass of said roll member, camera, extension arm, and counterbalance weight combined, said center of mass being positioned between said pivotal roll axis and said frame first end, wherein said frame longitudinal axis and said extension arm longitudinal axis form a parallel to angular relationship; and

(c) a dampener including a piston and a cylinder utilizing a variable size restriction orifice to control the flow of a fluid from said piston and cylinder to control a movement of said piston in relation to said cylinder, said dampener is driven by said roll member pivotal shaft that is rotatably attached to a pivotal shaft drive gear, said pivotal shaft drive gear is rotationally engaged to an idler gear, and said idler gear is rotationally engaged to a gear rack on said piston, wherein said relative arbitrary pivotal roll movement of said frame to said roll member is transmitted into said piston movement in relation to said cylinder by said pivotal shaft and drive gear, said idler gear, and said gear rack on said piston, said dampener is operational to control said relative arbitrary pivotal roll movement of said frame to said roll member resulting in a more controlled leveling action of the camera.

to claim 11 wherein said frame first end that is adapted to attach to the support structure includes an arcuate section configured to substantially conform to a portion of a marine vessel rail outside circumference, a rail clamp pivotal element that is pivotally attached to said frame first end, and a rail clamp fastener, wherein said frame first end is operational to attach to a marine vessel rail.

[c13] 13. A self leveling camera support apparatus according to claim 11 wherein said extension arm proximal end portion that is adjacent to said roll member further comprises a fixably adjustable element that allows said extension arm including said extension arm longitudinal axis to selectively deviate from being approximately perpendicular to said pivotal roll axis, wherein said fixably adjustable element is operational to accommodate a camera with an offset center of gravity by altering the position of said center of mass.

[c14] 14. A self leveling camera support apparatus according to claim 13 wherein said fixably adjustable element includes an aperture in said roll member that rotationally receives and axially retains said extension arm proximal end portion allowing a selected rotational position of said extension arm to be locked in place with a roll member lockable element, with said extension arm

proximal end portion including a fixed angle portion.

[c15] 15. A self leveling camera support apparatus according to claim 11 wherein said counter balance weight that is adjacent to said extension arm distal end portion is removably engagable from said extension arm distal end portion, being operational to selectively change the amount of counterbalance weight, being operational to alter or maintain a selected position of said center of mass, thus accommodating different weight cameras.

[c16] 16. A self leveling camera support apparatus according to claim 11 wherein said counter balance weight that is adjacent to said extension arm distal end portion is movably engagable along said extension arm distal end portion, being operational to selectively change the distance of said counter balance weight from said roll member being operational to alter or maintain a selected position of said center of mass, thus accommodating different weight cameras.

[c17] 17. A method of acquiring camera images of an aquatic event, comprising the steps of:
(a) providing a self leveling camera support apparatus that includes a frame having a longitudinal axis, said frame including a first end that is adapted to attach to a support structure and a second end that forms a pivotal

connection having a pivotal roll axis, also included is a roll member adapted to attach to a camera, said roll member is pivotally attached to said pivotal connection, being operational to pivot parallel to said pivotal roll axis, said roll member also includes an extension arm having a longitudinal axis, said extension arm including a proximal end portion that is adjacent to said roll member, said extension arm longitudinal axis being positioned approximately perpendicular to said pivotal roll axis, said extension arm also including a distal end portion that is adjacent to a counter balance weight, said roll member is operational to help maintain the camera positional orientation level in relation to arbitrary pivotal roll movement of said frame, resulting from a selectively positioned center of mass of said roll member, camera, extension arm, and counterbalance weight combined, said center of mass being positioned between said pivotal roll axis and said frame first end, wherein said frame longitudinal axis and said extension arm longitudinal axis form a parallel to angular relationship, said extension arm proximal end portion that is adjacent to said roll member further comprises a fixably adjustable element that allows said extension arm including said extension arm longitudinal axis to deviate from being approximately perpendicular to said pivotal roll axis, wherein said fixably adjustable element is operational to

accommodate a camera with an offset center of gravity, further included is an adjustable dampener that is positioned adjacent to both said frame and said roll member, said dampener is operational to help control a relative arbitrary pivotal roll movement of said frame to said roll member, wherein said frame longitudinal axis and said extension arm longitudinal axis form a parallel to angular relationship;

(b) attaching said frame first end to a support structure;

(c) attaching said camera to said roll member;

(d) positioning a selected amount of said counterbalance weight to accommodate a camera weight; and

(e) acquiring images of the aquatic event using a camera.

[c18] 18. A method of acquiring camera images of an aquatic event according to claim 17 further comprising a step after step (d) of adjusting said dampener by adjusting a dampener resistance to further control the relative arbitrary pivotal roll movement of said frame to said roll member.

[c19] 19. A method of acquiring camera images of an aquatic event according to claim 17 wherein said step of positioning a selected amount of said counterbalance weight further includes adjusting said fixably adjustable element, wherein said extension arm longitudinal axis can be adjusted to selectably deviate from being approxi-

mately perpendicular to said pivotal roll axis, wherein adjustment said fixably adjustable element is operational to accommodate a camera with an offset center of gravity by altering the position of said center of mass.